CHEROKEE NATION

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Principal Chief

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December 3, 2007

Aunjanee Gautreaux, 6PD-Q
Air Quality Analysis Section
U. S. EPA, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: CHEROKEE NATION COMMUNITY AIR TOXICS PROJECT FIFTH QUARTER TECHNICAL REPORT

Dear Ms. Gautreaux:
Enclosed is the Fifth Quarter Technical Report (June, July, August, 2007) for the Cherokee Nation's Community Air Toxics Project (Cooperative Agreement number XA-96619701-0). The fifth quarter financial report and MBE/WBE will be provided by the Cherokee Nation Accounting Department and by our budget analyst, respectively.

If you have any questions regarding these matters, please call Ryan Callison at 918-453-5093 or Kent Curtis at 918-453-5095.

Sincerely,

Jeannine Hale

Jeannine Hale
Administrator for Environmental Programs

Enclosure

cc: File

QUARTERLY TECHNICAL REPORT
for
CHEROKEE NATION ENVIRONMENTAL PROGRAMS (CNEP)
COMMUNITY AIR TOXICS PROJECT
(XA-96619701-0)

FIFTH QUARTER FY2007
(JUNE, JULY, AUGUST, 2007)

OVERVIEW OF PROJECT ORIGIN AND PURPOSE

The origin and purpose of this project are described in the first quarterly technical report for this project. In summary, the Cherokee Nation is currently conducting this 18-month VOC sampling project at its Cherokee Heights (aka, Pryor) site (**Figure 1**), collecting samples in vacuum canisters for analyses via EPA Test Method TO-15. Over 90 samples will be collected using a 1-in-6 day sampling interval. The 18-month project will document seasonal variations in VOC concentrations and will focus on hazardous air pollutants (VOC HAPs) identified as "drivers" in the 1999 NATA, as well as on VOC HAPs detected in the Cherokee Nation's screening project from the winter of 2005. Project data will be shared with the EPA, the state of Oklahoma (ODEQ), the Cherokee Nation, and the general public via AQS, XML flat file, and other means, as appropriate.

FIFTH QUARTER GOALS, OBJECTIVES, AND ACCOMPLISHMENTS

1. Continue sample collection in accordance with the Proposed Sampling Schedule for this project. Sample collection began as scheduled on September 26, 2006. Fifty-three samples (plus six duplicates) were collected as of August 28, 2007. Summary information for these 59 samples is shown on the first three pages of the Proposed Sampling Schedule for this project, which is included as **Appendix A** of this quarterly technical report. Six samples – collected on December 1st, December 25th, April 18th, and June 29th – were invalid (unuseable) because the sample canisters had internal pressures of zero at the end of sample collection or because a leak from the canisters was suspected or because the sample period was too long. A further explanation of problems encountered with sample collection and analysis is included in the "Problems Encountered" section of this quarterly technical report.

Ask mike Jones about Funding possibilities

2. Perform NATTS Certification and flow verification check on backup RM910A sampler. The CNEP sent its backup sampler to ERG for an EPA Compendium Method TO-15 "canister sampling system certification" (aka, NATTS Certification) in February, 2007. ERG performed this certification on February 5 and the sampler passed the certification. ERG returned the sampler to the CNEP in February, but the CNEP has not yet performed a flow verification check on it.

3. ERG will begin reporting sample data to the CNEP within 45 days after the completion of the first month of sample collection. The CNEP received lab data for its

Ask Mike J

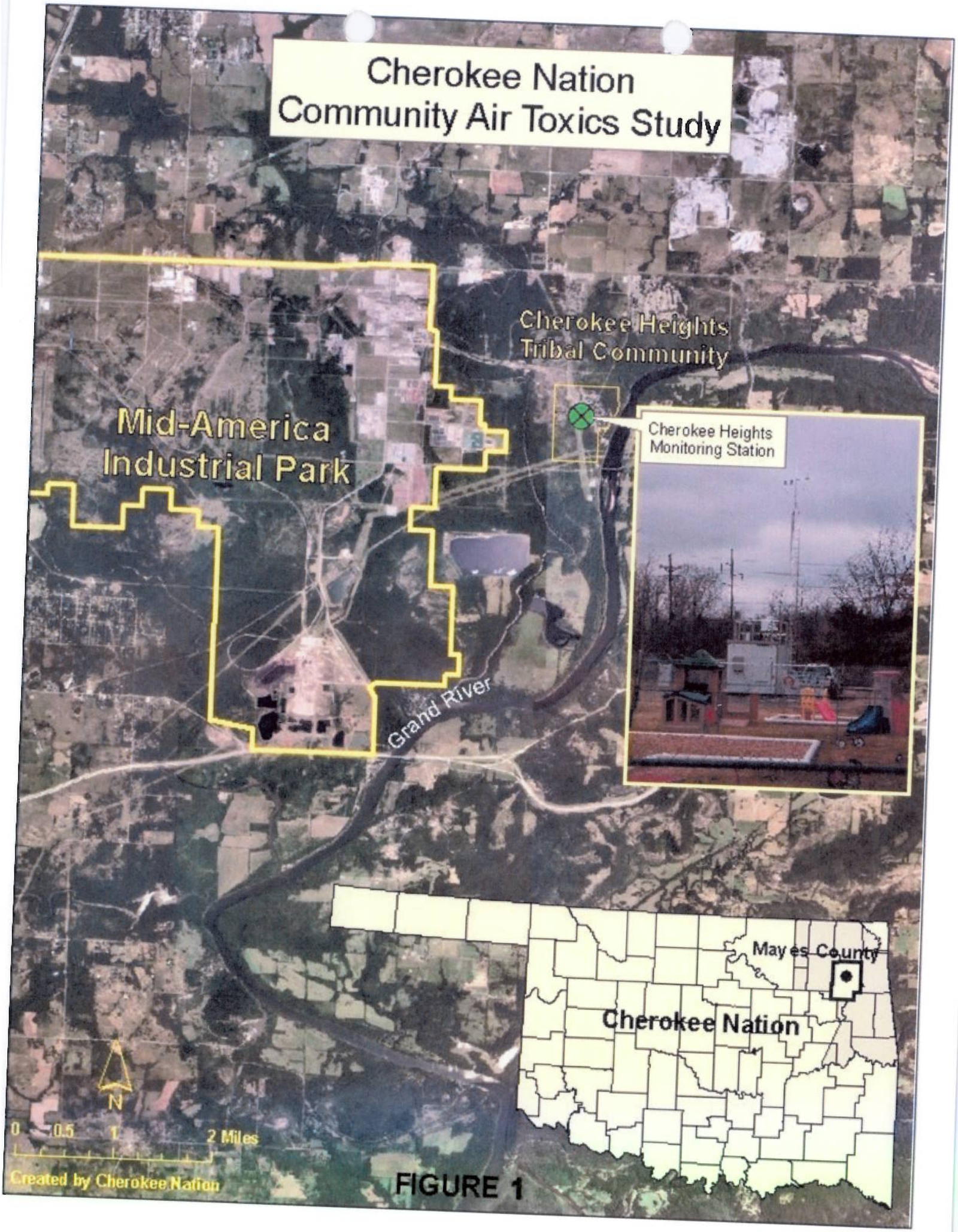

Cherokee Nation
Community Air Toxics Study
Cherokee Heights
Tribal Community
Mid-America
Industrial Park
Cherokee Heights
Monitoring Station
Grand River
Mayes County
Cherokee Nation
N
0 0.5 1 2 Miles
Created by Cherokee Nation

FIGURE 1

first seven samples – collected from September 26th through October 26th – from ERG in December, 2006. Subsequently, the CNEP received data for samples collected from November, 2006 through August, 2007. The CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for April 6th through June 23rd, 2006 to the AQS website in September, 2007.

4. One or more CNEP staff members will attend the following Air Pollution Training Institute courses: "Sources and Control of VOC Air Pollutants" in Oklahoma City (July), and "Introduction to Hazardous Air Pollutants" in Baton Rouge, Louisiana (August). Jacque Adam and April Hathcoat attended the "Sources and Control of VOC Air Pollutants" course in Oklahoma City in July, and Jacque, April, Danielle Keese, and Jeremy Freise attended the "Introduction to Hazardous Air Pollutants" course in Baton Rouge, Louisiana in August.

5. The CNEP will begin revising its *Quality Assurance Project Plan and Work Plan* for this VOC monitoring project. Revision of the *Quality Assurance Project Plan and Work Plan* for this project was delayed because of Kent Curtis' medical leave of absence. Aunjanee Gautreaux of the EPA office in Dallas extended the approval of the existing QAPP through January 26, 2008. The CNEP will begin revising the QAPP in late November, 2007. Submitted 12/19 – Logged into QTRAK via hand delivery by Liz Brazil

Summary of Fifth Quarter Goals, Objectives, and Accomplishments. The goals and objectives of this project, including overall goals, have not changed from the original CNEP application for funding. Fifth quarter goals and objectives for this project were to continue sample collection, analyze sample data, obtain NATTS certification for the CNEP's backup RM910A sampler, send CNEP staff to technical conferences and trainings pertaining to air toxics monitoring, and begin revision of the project QAPP. With the exception of the QAPP, these goals and objectives have been met. No significant difficulties or delays were encountered in meeting these fifth quarter goals and objectives. Approval of the existing QAPP was extended to January, 2008. In summary, work for this project is on schedule.

Project Timeline and Milestones. The following list shows the timeline and milestones for the entire two-year duration of this project. *Milestones that have been met are shown in italics.*

(1) Cherokee Nation will receive EPA approval of its QAPP for this project by June 1, 2006, or by the end of the second month of the project. *The original QAPP/Work Plan for this project was approved by the EPA in February, 2006. The CNEP revised this original QAPP in September, 2006, and the revised QAPP was approved by EPA on October 26, 2006.*

(2) Cherokee Nation will solicit bids from labs for sample analysis during the first month of the project and will select the winning bid and award the contract by the beginning of

the third month of the project. *ERG was selected (August, 2006) to analyze project samples and perform data reporting for the project.*

(3) Cherokee Nation will begin sample collection by the beginning of the third month (September, 2006) of the project, or by the date of project QAPP approval by EPA, whichever is later. *Sample collection for this project began on September 26, 2006. As of August 28, 2007, fifty-three samples (plus six duplicate samples) had been collected for this project.*

(4) Cherokee Nation will begin data analysis as soon as the first data is received from lab. Data analysis will continue to the end of the project on May 31, 2008. *The CNEP began receiving lab data from ERG in December, 2006. As of July, 2007, the CNEP had analyzed ERG data for the first thirty-eight samples – collected from September 26, 2006 through May 30, 2007. Data analysis will be an ongoing activity until the end of this project in May, 2008.*

(5) Cherokee Nation will complete sample collection by the end of 18 months of sampling (March, 2008).

(6) ERG will submit sample data to CNEP within 45 days after the end of each month of sample collection. ERG will submit statistical analyses of data and quality assurance reports to CNEP at the end of each year of the project. *ERG began submitting sample data to the CNEP in December, 2006 (see Project Timeline and Milestone item 4 above).*

(7) ERG, under the terms of its contract with CNEP, will post project data to AQS within 90 days of the end of each calendar quarter. Posting of project data to AQS will begin as early as the 9th month (March, 2007) of the project. ERG will complete final posting of project data to AQS within 90 days after the conclusion of the project on May 31, 2008. *ERG posted project data for September, 2006 through June, 2007 to the AQS website in March, June, and September, 2007. Submission of data to AQS will be an ongoing activity until the end of this project.*

(8) Cherokee Nation will host public meeting to present results of project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

(9) Cherokee Nation will submit final project report to EPA within 90 days after the conclusion of the project on May 31, 2008. Quarterly technical reports will be submitted to EPA within 30 days after the end of each three-month quarter of each fiscal year.

CHANGES IN KEY PERSONNEL INVOLVED IN PROJECT

The following seven persons in the CNEP air quality monitoring program are working on this project:

Ryan Callison, Project Manager
Kent Curtis, Project QA/QC Manager

April Hathcoat, Environmental Specialist II
Jacque Adam, Environmental Specialist I
Jeremy Freise, Environmental Specialist I
Danielle Keese, Environmental Specialist I
Larry Scrapper, Environmental Specialist I

Ryan has overall responsibility for the project. Kent is responsible for project planning, project oversight, and QA/QC management. Kent and April are responsible for project data management. April, Jacque, Jeremy, Danielle, and Larry have primary responsibility for sample collection and equipment maintenance, while Kent and Ryan may also assist with such tasks.

ERG is the laboratory responsible for sample analyses and data reporting for the project. Key contacts at ERG are Julie Swift (project oversight), Ray Merrill (QA oversight), Dave Dayton (Method TO-15 canister sampling system certification), and Rodney Williams (canister sample shipping and receiving).

Figure 2 is an organizational chart showing all parties involved in this project. Those personnel named in the preceding paragraphs are directly involved in this project while other parties shown in **Figure 2** play supporting roles in the project.

EXPENDITURES TO DATE

A total of $114,529 of the $165,000 awarded for this grant was spent or obligated by the CNEP by the end of the fifth quarter of this project. Most of the money spent or obligated was for one-time expenditures: $47,520 obligated to ERG for the performance of sample analyses and data reporting during the period from September, 2006 through August, 2008; and $4,522 obligated to RM Environmental, Inc. for a backup RM910A sampler and spare parts (seals, etc.) for the primary RM910A sampler. The remaining expenditures through the end of the fifth quarter were $20,304 for salaries, $17,750 for fringe benefits, $4,438 for travel, $2,091 for supplies (including two Restek sample canisters), $8,369 for other costs, and $9,535 for indirect costs. Thus expenditures and obligations through the end of the fifth quarter are within the overall budget for the project. In other words, expenditures for salaries, fringe benefits, indirect costs, and other expenses are not expected to exceed the total awarded for the two-year life of the grant.

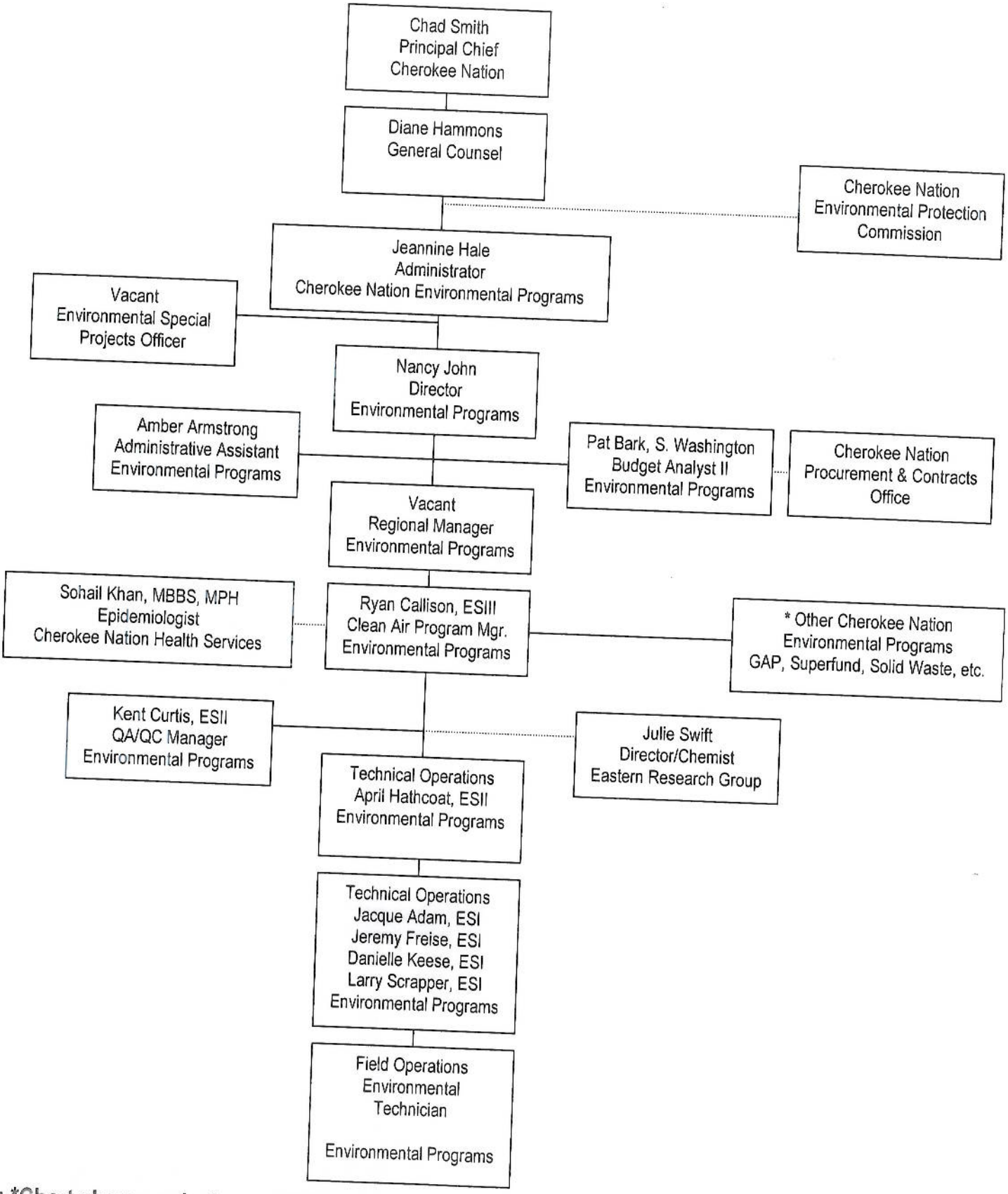
COMPLIANCE WITH QUALITY ASSURANCE REQUIREMENTS

The CNEP's original QAPP/Work Plan for this project was approved by the EPA in February, 2006. A revision of this QAPP was completed by the CNEP on September 21, 2006 and was approved by the EPA on October 26, 2006. EPA approval of this QAPP has been extended to January 26, 2008.

In addition, the CNEP is operating under a Quality Management Plan (QMP) approved by the EPA on May 9, 2007. The CNEP air quality monitoring program is also operating

Cherokee Nation Environmental Programs
Organizational Chart

Figure 2



Note: *Chart shows only those CNEP staff directly involved in the Community Air Toxics Project

AIR TOXIC HISTORY (08-31-07)

AWARD CATEGORY / BUDGET	
Personnel	31,769.00
Fringe	11,078.00
Travel	9,011.00
Contractual	77,000.00
Supplies	3,400.00
Equipment	6,995.00
Other	13,600.00
IDC	12,147.00
	165,000.00

Expenditures	Actual	Encumbrance	Commitment	Total	Balance
20,304.15	20,304.15	0.00	0.00	20,304.15	19,379.85
17,749.99	17,749.99	0.00	0.00	17,749.99	(4,605.99)
4,438.13	4,438.13	0.00	0.00	4,438.13	6,331.87
19,800.00	19,800.00	27,720.00	0.00	47,520.00	29,780.00
2,091.17	2,091.17	0.00	0.00	2,091.17	1,408.83
4,522.00	4,522.00	0.00	0.00	4,522.00	(4,522.00)
8,369.28	8,369.28	0.00	0.00	8,369.28	(962.28)
9,534.58	9,534.58	0.00	0.00	9,534.58	3,660.42
86,809.30	**86,809.30**	**27,720.00**	**0.00**	**114,529.30**	**50,470.70**

SUMMARY

06/01/06 - 08/31/07

under several other EPA-approved QAPPs, including QAPPs for criteria pollutant monitoring (including meteorological instruments) and for PM2.5 and PM10 monitoring.

The contracted laboratory, ERG, is operating under the following EPA-approved QAPP: *Support for the EPA National Monitoring Programs (NMOC, UATMP, PAMS, HAPs, and NATTS)* for 2007/2008.

RESULTS TO DATE

Fifty-three valid samples (plus six valid duplicates) were collected from September 26, 2006 through August 28, 2007 (see first two pages of **Appendix A** in this quarterly technical report). Six additional samples were declared invalid by the CNEP due to problems that affected data quality. ERG has submitted data for the 59 valid samples – collected from September 26, 2006 through August 28, 2007 – to the CNEP and the CNEP has analyzed this data. The CNEP's Data Summary reports are included in **Appendix B** of this quarterly technical report, along with CNEP tables of all the data. The data tables were compiled to facilitate the discovery and analysis of any seasonal trends in the data. ERG posted the data for September 26th through June 23rd, 2007 to the AQS website in March, June, and September, 2007.

The number of VOCs detected in each of the first 59 samples ranged from 14 to 30. The concentrations of the detected VOCs were compared to the following benchmarks: EPA Region 6 Human Health Medium-Specific Screening Levels, including chronic inhalation toxicity values (non-cancer and cancer values), and including screening values for ambient air; Oklahoma Department of Environmental Quality (ODEQ) MAACs; and ATSDR Minimal Risk Levels (MRLs) for inhalation. The concentrations of 3 to 7 of the detected VOCs equaled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows: acrolein; chloromethane; 1,3-butadiene; chloroform; benzene; carbon tetrachloride; trichloroethylene; and 1,2-dichloroethane. A more detailed analysis of these results is included in **Appendix B** of this quarterly technical report.

PROBLEMS ENCOUNTERED

No serious problems were encountered during the fifth quarter of this project. Several minor problems that occurred during the fifth quarter are described here. Another problem (MDLs) that has carried over from the third quarter is also discussed.

A duplicate sample could not be collected as scheduled on June 23rd because the duplicate canister arrived at CNEP with zero pressure. The CNEP received several canisters from ERG that showed signs of leakage. These canisters did not appear to have defective welds or valves. The CNEP is working with ERG to ensure that ERG provides the CNEP with canisters that have the proper initial vacuum.

The duplicate samples scheduled to run on June 29th were invalid because their sample collection period was 110 hours instead of 24 hours. The incorrect sampling period was

probably the result of operator error in programming the automatic timer for the RM910A sampler.

Kent Curtis was on medical leave of absence from August 10th through November 1st due to a serious illness. Consequently, tasks performed for this VOC monitoring project by Kent, including VOC data analysis, preparation of the fifth quarterly technical report, and revision of the project QAPP, were postponed from August and September to November, 2007.

Method Detection Limits (MDLs) reported by ERG for samples collected in 2007 are higher than the MDLs reported for samples collected for this project in 2006. Fourteen of these higher MDLs are higher than the EPA Region 6 Human Health Screening Levels to which project data are being compared. If possible, the MDLs for all VOCs included in this project should be *lower* than the Screening Levels. If MDLs are *higher* than these Screening Levels, then it is likely that false negatives will be reported for VOCs of particular concern in this project. That is, data may falsely show that a particular VOC is not present at a concentration higher than a Screening Level when, in fact, that VOC may actually be present at a concentration higher than the Screening Level but lower than the MDL achieved by the lab. [See Data Summary in **Appendix B** for further discussion of this problem.] The CNEP conferred with ERG to determine the cause of the higher MDLs reported for the samples collected in 2007. ERG explained that it recalculates its MDLs at the beginning of each calendar year. The new MDLs are then used for the next twelve months. These new MDLs may be higher, lower, or the same for any given VOC as the MDLs used during the previous year. Thus the new MDLs must be used, even if they are higher than a Screening Level of concern. This limits the usefulness of some project data and forces the CNEP to accept the possibility of false negatives for some VOCs of concern, including 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene.

Of the first 65 samples collected (including six duplicates) from September 26, 2006 through August 28, 2007, 59 samples yielded valid (useable) data. Thus the data completion rate for the first eight months of sample collection is 90.77%. This meets the desired data completion rate of 85%, which is specified in Section 2.5 of the Revised QAPP/Work Plan for this project.

ACTIVITIES PLANNED FOR SIXTH QUARTER OF THIS PROJECT

1. Continue sample collection in accordance with the Proposed Sampling Schedule for this project (see **Appendix A** of this quarterly technical report).

2. The CNEP will revise its *Quality Assurance Project Plan and Work* Plan for this VOC monitoring project.

3. The CNEP will perform a flow verification check on its NATTS-certified backup RM910A sampler.

4. ERG will continue reporting sample data to the CNEP at monthly intervals. ERG, under the terms of its contract with CNEP, will continue posting project data to AQS within 90 days of the end of each calendar quarter.

5. April Hathcoat will attend the EPA National Environmental Justice and Air Workshop in San Francisco on September 6-7 and give a presentation about CNEP air quality monitoring projects, including the VOC monitoring project.

PUBLICATIONS ARISING FROM THIS PROJECT

The CNEP will present the results of this project at one or more regional or national conferences as project data become available. Such presentations will occur in 2007 and 2008. Kent Curtis attended the Air and Waste Management Association's Symposium on Air Quality Measurement Methods and Technology in San Francisco on April 30-May 2, 2007. He gave a brief presentation on the CNEP's Community Air Toxics Project, including a summary of sample data collected as of February, 2007. This presentation will be published in the proceedings of the symposium. There are no plans at this time to publish the final results of this project.

The CNEP will share data from this project with the Cherokee Nation's Health Services department. The CNEP and the CN Health Services may jointly host a public meeting to present results of this project to residents of Cherokee Heights no later than the final month of the project (May, 2008).

APPENDIX A

PROPOSED SAMPLING SCHEDULE FOR THIS PROJECT

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all.
Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring.
Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
1	2280	2280	September	26	2006	Tue		
2A	2275	2275	October	2	2006	Mon		
2B	2272	2272	October	2	2006	Mon	Yes	
3	2276	2276	October	10	2006	Tue		Make-up for sample that didn't run on 10/8
4	2284	2284	October	18	2006	Wed		Make-up for sample that didn't run on 10/14
5	3357	3357	October	20	2006	Fri		Graseby canister
6	3359	3359	October	26	2006	Thur		Graseby canister; shelter temp 130 on 10/24
7	2275	2275	November	1	2006	Wed		
8A	2272	2272	November	7	2006	Tue		
8B	2280	2280	November	7	2006	Tue	Yes	
9	2276	2276	November	13	2006	Mon		
10	2284	2284	November	19	2006	Sun		
11	3357	3357	November	25	2006	Sat		Graseby canister
12	3359	3359	December	1	2006	Fri		Graseby canister, +2 final canister pressure at Pryor, 0 at ERG; INVALID SAMPLE
13	2275	2275	December	7	2006	Thur		
14	2272	2272	December	13	2006	Wed		
15	2280	2280	December	19	2006	Tue		
16	3627	3627	December	25	2006	Mon		0 final canister press.; INVALID SAMPLE
17	3628	3628	December	31	2006	Sun		New Year's Eve
18	2275	2275	January	6	2007	Sat		
19A	2284	2284	January	12	2007	Fri		
19B	2272	2272	January	12	2007	Fri	Yes	
20	2276	2276	January	18	2007	Thur		
21	2280	2280	January	24	2007	Wed		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all.
Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring.
Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
22	3627	3627	January	30	2007	Tue		
23	3628	3628	February	5	2007	Mon		
24	2272	2272	February	11	2007	Sun		
25	2284	2284	February	17	2007	Sat		
26	2276	2276	February	23	2007	Fri		
27	2280	2280	March	1	2007	Thur		
28	3627	3627	March	7	2007	Wed		
29	2284	2284	March	13	2007	Tue		
30	2272	2272	March	19	2007	Mon		
31	3628	3628	March	25	2007	Sun		
32	2276	2276	March	31	2007	Sat		
33	2280	2280	April	6	2007	Fri		
34	2284	2284	April	12	2007	Thur		
35A	3627	3627	April	18	2007	Wed		+2 final can press, INVALID SAMPLE
35B	2275	2275	April	18	2007	Wed	Yes	+2 final can pr; suspected leak, INVALID
36	3628	3628	April	24	2007	Tue		
37A	2275	2275	April	30	2007	Mon		
37B	3627	3627	April	30	2007	Mon	Yes	
38	2272	2272	May	6	2007	Sun		
39	2276	2276	May	12	2007	Sat		
40	2280	2280	May	18	2007	Fri		
41	2284	2284	May	24	2007	Thur		
42	3627	3627	May	30	2007	Wed		
43	3628	3628	June	5	2007	Tue		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
44	2275	2275	June	11	2007	Mon		
45	2272	2272	June	17	2007	Sun		
46	3627	3627	June	23	2007	Sat		Dup. can couldn't run, 0 initial pressure
47A	2276	2276	June	29	2007	Fri		Sample ran for 110.04 hrs, INVALID
47B	2280	2280	June	29	2007	Fri	Yes	Sample ran for 110.04 hrs, INVALID
48	3628	3628	July	5	2007	Thur		
49A	2275	2275	July	11	2007	Wed		Make-up duplicate for June 29
49B	2272	2272	July	11	2007	Wed	Yes	Make-up duplicate for June 29
50	3359	3359	July	17	2007	Tue		Graseby canister
51	3627	3627	July	23	2007	Mon		
52	2280	2280	July	29	2007	Sun		
53A	2272	2272	August	4	2007	Sat		
53B	2275	2275	August	4	2007	Sat	Yes	
54	3628	3628	August	10	2007	Fri		
55	2280	2280	August	16	2007	Thur		
56	2276	2276	August	22	2007	Wed		
57	3627	3627	August	28	2007	Tue		
58	2275	2275	September	3	2007	Mon		Labor Day
59	3359	3359	September	9	2007	Sun		Graseby canister
60	3628	3628	September	15	2007	Sat		
61	2280	2280	September	21	2007	Fri		
62	2276	2276	September	27	2007	Thur		
63	2272	2272	October	3	2007	Wed		Sample ran for 33.06 hrs, +3 final press
64A	-	-	October	9	2007	Tue		No sample, no canister available
64B	-	-	October	9	2007	Tue	Yes	No sample, no canister available

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
65	3627	3627	October	15	2007	Mon		
66	2280	2280	October	21	2007	Sun		
67	2272	2272	October	27	2007	Sat		
68	3628	3628	November	2	2007	Fri		
69	2276	2276	November	8	2007	Thur		
70	3627	3627	November	14	2007	Wed		
71	2280	2280	November	20	2007	Tue		
72	2284	2284	November	26	2007	Mon		
73	2275	2275	December	2	2007	Sun		
74			December	8	2007	Sat		
75			December	14	2007	Fri		
76			December	20	2007	Thur		
77A			December	26	2007	Wed		
77B			December	26	2007	Wed	Yes	
78			January	1	2008	Tue		NY Day
79			January	7	2008	Mon		
80A			January	13	2008	Sun		
80B			January	13	2008	Sun	Yes	
81			January	19	2008	Sat		
82			January	25	2008	Fri		
83			January	31	2008	Thur		
84			February	6	2008	Wed		
85			February	12	2008	Tue		
86			February	18	2008	Mon		

PROPOSED SAMPLE DATES FOR AIR TOXICS PROJECT AT PRYOR, 2006-2008

There are 92 sample dates, with duplicate samples being collected on 10 of those dates. There are 102 samples in all. Sample dates correspond to the EPA's 1-in-6 day sampling schedule used for ambient particulate monitoring. Dates for duplicate samples were selected randomly by using a random number table.

CNEP Sample Number	CNEP Canister Number	Lab Sample Number	Sample Date				Duplicate Sample	Notes
			Month	Day	Year	Day of Week		
87A			February	24	2008	Sun		
87B			February	24	2008	Sun	Yes	
88			March	1	2008	Sat		
89			March	7	2008	Fri		
90A			March	13	2008	Thur		
90B			March	13	2008	Thur	Yes	
91			March	19	2008	Wed		
92			March	25	2008	Tue		

APPENDIX B

CNEP DATA SUMMARY REPORTS AND DATA TABLES FOR SAMPLES COLLECTED FROM SEPTEMBER 26, 2006 THROUGH AUGUST 28, 2007

DATA SUMMARY
FOR VOC SAMPLES COLLECTED AT CHEROKEE NATION'S PRYOR SITE FROM JULY 5 THROUGH AUGUST 28, 2007

I have analyzed the data for our first twelve valid VOC samples of the summer season, which were collected from July 5 through August 28, 2007. The following is a summary of my analyses.

All 12 samples are valid samples, as the canisters had final pressures that were less than zero or more than zero. Data completeness (12 valid samples out of 12 total samples) = 100%. This exceeds the desired data completion rate of 85%.

ERG analyzed each of the 12 valid samples for 60 VOCs.

The number of VOCs detected in each sample ranged from 17 (July 5, July 17, August 22) to 27 (July 11). The average number of VOCs detected in each sample was 22, which was higher than the average of 18.9 VOCs detected in the 16 valid samples collected during the winter of 2007 but lower than the average of 26.1 VOCs detected in the 17 valid samples collected during the autumn of 2006.

The lab (ERG) reported the same MDLs for samples collected in July and August as for the samples collected in February through June. 12 of these MDLs achieved for VOCs in samples collected in February through August were higher than one of the EPA Region 6 Human Health Medium-Specific Screening Levels of concern. [These screening levels are described in the following paragraph.] **MDLs in excess of a screening level are of concern because they include the MDLs for 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene – four of the VOCs that exceeded a screening level in one or more samples collected in the autumn of 2006, and in the winter, spring, and summer of 2007. These higher MDLs make it more likely that false negatives will be reported for VOCs of particular concern. The probability of false negatives must be reduced in future sample analyses.**

I compared the concentrations of detected VOCs in the July and August samples to the following benchmarks:

EPA Region 6 Human Health Medium-Specific Screening Levels
  Chronic inhalation toxicity values (non-cancer and cancer values)
  Region 6 Screening values for ambient air
Oklahoma Department of Environmental Quality (ODEQ) MAACs
ATSDR Minimal Risk Levels (MRLs) for inhalation

3 to 5 detected VOCs equalled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows:

Acrolein, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.20 to 2.13 ug/m3.

Chloromethane, exceeding a benchmark in 10 samples, with a concentration range in those ten samples of 1.13 to 1.53 ug/m3.

Chloroform, exceeding a benchmark in 2 samples, with a concentration range in those two samples of 0.10 to 0.12 ug/m3.

Benzene, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.17 to 0.56 ug/m3.

Carbon tetrachloride, exceeding a benchmark in all 12 valid samples, with a concentration range in these twelve samples of 0.21 to 0.91 ug/m3.

Chloromethane and chloroform exceeded only screening levels.

Benzene and carbon tetrachloride exceeded both screening levels and cancer benchmarks.

Acrolein exceeded both screening levels and a non-cancer benchmark. In addition, acrolein was the only VOC to exceed an ODEQ MAAC and an ATSDR MRL.

Results for the four duplicate samples collected on July 11 and August 4 were good. Only 2 or 3 of the 22 to 27 detected VOCs had a relative percent difference (RPD) greater than 25%.

The benzene/toluene ratios in the fourteen valid samples ranged from 0.47 to 1.45. These ratios are NOT characteristic of vehicular (gasoline engine) emissions.

The concentrations of carbon tetrachloride and chlorofluorocarbons [Dichlorodifluoromethane (freon 12), Dichlorotetrafluoroethane (freon 114), and Trichlorofluoromethane (freon 11)] detected in the twelve samples were relatively stable. The concentration ranges of each of these VOCs in the twelve samples were as follows: carbon tetrachloride (0.21 to 0.91 ug/m3); Freon 12 (0.73 to 3.02 ug/m3); Freon 114 (0.02U to 0.16 ug/m3); and Freon 11 (0.36 to 1.63 ug/m3). This is consistent with the fact that such VOCs have stable global background concentrations in the USA.

With one exception, there were no exceedances of NAAQS standards (24-hour or 8-hour standard, as applicable) for NO2, SO2, PM10, PM2.5, and ozone at the Pryor station on any of the ten VOC sample days. The mean of 39.4 ug/m3 for PM2.5 exceeded the 24-hour NAAQS standard on August 16.

Finally, the wind direction was predominantly from the south on July 17 and on all five sample dates in August. The wind was from all directions except the northwest on July 5 and July 23. The wind was from the north, northeast, east, southeast, and west on July 11, and it was from the northwest, north, northeast, east, and southeast on July 29. Wind speeds varied from 0 to 10 mph on the ten sample days. The Cherokee Heights tribal housing complex and the city of Locust Grove lie to the east and southeast of the Pryor monitoring station; U. S. highway 412 lies south of the station; Mid-America Industrial Park lies to the west, southwest, and northwest of the station; and other industry lies to the northeast of the station. There was no rainfall on nine of the ten valid sample dates, while 0.15 inches of rain fell on July 5. Ambient air temperatures ranged from a low of 70 degrees F on July 11 and July 23 to a high of 99 degrees F on August 16.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS

Analysis of the 59 valid samples collected from September 26, 2006 to August 28, 2007 revealed no obvious seasonal trends in occurrences or concentrations of VOCs (see attached Tables of seasonal trends data), although the data has not been subjected to statistical analysis. The decline in the average number of VOCs detected in the 2007 samples was an artifact of the higher MDLs achieved by the lab for those samples (see discussion of MDLs above). Otherwise, particular VOCs did not appear or disappear with the changing seasons, and the concentrations of detected VOCs did not show a tendency to rise or fall with the changing seasons. The concentrations of detected VOCs remained steady, fluctuating within a narrow range of concentrations that showed little or no change with the seasons. The concentrations of some

VOCs remained remarkably constant, perhaps because they were present only at concentrations that were very close to the method detection limits that the lab (ERG) could achieve.

Of the eight VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of the 59 valid samples, only acrolein showed a very slight tendency to change in concentration with the seasons. Acrolein was present at its highest concentrations in September and early October, 2006, then declined very slightly in concentration after mid-October. Six of the other seven VOCs showed no tendency to rise or fall in concentration with the changing seasons, while the remaining VOC (1,2-dichloroethane) was detected in only one sample (November 25). Meanwhile, the concentrations of carbon tetrachloride leveled off at the low end of their range during the months of January and February, 2007.

ERG analyzed each of the 12 valid samples collected in July and August, 2007 for a suite of 60 VOCs (see attached Table of seasonal trends data). 13 VOCs were detected in all 12 valid samples, while 8 other VOCs were detected in 9 to 11 samples. Of the five VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of these 12 valid samples, acrolein, chloromethane, benzene, and carbon tetrachloride were detected in all 12 samples, while chloroform was detected in 3 samples.

Conversely, 32 VOCs were undetected in all 12 samples, while the 7 remaining VOCs were detected in 1 to 6 samples.

There are relatively stable global background concentrations of carbon tetrachloride and chlorofluorocarbons (such as freons) in the atmosphere. Therefore, it was no surprise that carbon tetrachloride and three of the other four chlorofluorocarbons included in sample analyses for this project were detected in all 12 valid samples collected in July and August at concentrations that showed no tendency to vary with the changing seasons.

VOC concentrations in the three samples collected on a Saturday or Sunday did not appear to differ significantly from VOC concentrations in samples collected on week days. Thus there are few, if any, noticeable changes in VOC concentrations on weekends, when industrial activity at Mid-America Industrial Park and other nearby industries might be expected to decline.

In summary, eleven months of VOC data have been collected so far, and, as yet, no seasonal trends have become apparent in the occurrences and concentrations of VOCs.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS
5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	**Valid Sample Dates ****														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Acetylene	0.32	0.31 0.29	0.14	0.78	0.38	0.27 0.28	0.36	0.26	0.14	0.31					
Propylene	0.24	0.33 0.52	0.20	0.41	0.37	0.51 0.36	0.94	0.30	0.27	0.70					
Dichlorodifluoromethane (Freon 12)	0.73	2.85 2.82	2.39	2.99	3.02	2.59 2.72	2.48	2.53	2.55	2.60					
Chloromethane	0.39	**1.36** **1.34**	**1.23**	**1.35**	**1.50**	**1.24** **1.30**	**1.53**	**1.18**	**1.13**	1.09					
Dichlorotetrafluoroethane (Freon 114)	0.02U	0.15 0.16	0.11U	0.13U	0.06U	0.11U 0.12U	0.11U	0.11U	0.06U	0.12U					
Vinyl Chloride	ND	0.02U 0.02U	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,3-Butadiene	ND	0.03U 0.03U	0.01U	0.02U	0.03U	0.02U 0.02U	0.02U	ND	ND	0.02U					
Bromomethane	ND	0.08U 0.08U	0.05U	0.07U	0.07U	0.07U 0.06U	0.05U	0.08U	0.06U	0.07U					

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in this sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **													
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Chloroethane	ND	0.08 0.09	0.08	0.07	0.10	0.07 0.08	0.10	0.08	0.08	0.09					
Acetonitrile	ND	0.27 0.27	0.27	0.28	0.35	0.36 0.39	0.37	0.54	0.34	0.54					
Acrolein	**0.20**	**1.42** **1.59**	**0.25**	**1.45**	**1.51**	**1.89** **1.84**	**1.55**	**1.51**	**1.31**	**2.13**					
Trichlorofluoromethane (Freon 11)	0.36	1.58 1.51	1.31	1.57	1.63	1.42 1.51	1.24	1.48	1.42	1.54					
Acrylonitrile	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,1-Dichloroethene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Dichloromethane (Methylene Chloride)	0.03U	0.26 0.24	0.13	0.22	0.16	0.20 0.23	0.12	0.13	0.15	0.18					
Carbon Disulfide	0.06U	0.11 0.12	0.10	0.12	0.09	0.08 0.07	0.11	ND	0.08	0.08					

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

5 July to 27 September, 2007

Samples were 24-Hour time-weighted average samples collected in 6L canisters and analyzed via EPA Test Method TO-15.

VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Trichlorotrifluoroethane	0.18	0.72 0.75	0.75	0.75	0.75	0.63 0.68	0.53	0.81	0.66	0.68					
Trans-1,2-Dichloroethylene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,1-Dichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Methyl tert-Butyl Ether	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Methyl Ethyl Ketone	0.69	3.52 6.06	0.98	5.23	2.63	5.91 4.17	5.56	1.94	3.01	8.07					
Chloroprene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
cis-1,2-Dichloroethylene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Bromochloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					

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VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
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Chloroform	ND	ND ND	0.06U	**0.12**	0.08U	ND ND	0.06U	0.08	0.06U	**0.10**					
Ethyl tert-Butyl Ether	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,2-Dichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,1,1-Trichloroethane	0.03U	0.11 0.12	0.06U	0.10	0.09	0.09U 0.09U	0.07U	0.07U	0.08U	0.08U					
Benzene	**0.17**	**0.41** **0.47**	**0.33**	**0.46**	**0.45**	**0.56** **0.51**	**0.43**	**0.40**	**0.45**	**0.43**					
Carbon Tetrachloride	**0.21**	**0.82** **0.84**	**0.57**	**0.91**	**0.88**	**0.66** **0.71**	**0.76**	**0.57**	**0.63**	**0.64**					
tert-Amyl Methyl Ether	ND	0.02U ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,2-Dichloropropane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

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SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

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Ethyl Acrylate	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Bromodichloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Trichloroethylene (TCE)	ND	0.10 0.06U	ND	0.07U	ND	ND ND	ND	ND	ND	0.08U					
Methyl Methacrylate	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
cis-1,3-Dichloropropene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Methyl Isobutyl Ketone	0.10	0.33 0.48	0.12	0.46	0.21	0.45 0.38	0.60	0.10	0.21	0.44					
trans-1,3-Dichloropropene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,1,2-Trichloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					

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Toluene	0.20	0.88 0.94	0.27	0.48	0.48	0.63 0.65	0.57	0.40	0.31	0.49					
Dibromochloromethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,2-Dibromoethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
n-Octane	0.05	0.06 0.07	0.03	0.04	0.07	0.06 0.05	0.08	0.07	0.05	0.05					
Tetrachloroethylene	ND	0.07 0.07U	0.03U	0.05U	0.04U	0.04U 0.05U	ND	0.03U	ND	ND					
Chlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	0.02U	0.01U					
Ethylbenzene	0.06	0.14 0.15	0.04U	0.07	0.08	0.12 0.12	0.10	0.07	0.05U	0.09					
m,p-Xylene	0.03U	0.36 0.41	0.08U	0.13	0.18	0.19 0.18	0.21	0.12	0.02U	0.17					

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VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
Bromoform	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Styrene	0.08	0.09 0.09	0.03U	0.05U	0.05U	0.09 0.05U	0.08	ND	0.04U	0.07					
1,1,2,2-Tetrachloroethane	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
o-Xylene	0.06	0.16 0.19	0.04U	0.07	0.09	0.09 0.10	0.09	0.07	0.04U	0.08					
1,3,5-Trimethylbenzene	0.04U	0.06 0.07	0.01U	0.02U	0.03U	0.09 0.08	0.03U	0.02U	0.02U	0.02U					
1,2,4-Trimethylbenzene	0.07	0.15 0.19	0.04U	0.05	0.12	0.19 0.17	0.11	0.06	0.04U	0.09					
m-Dichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Chloromethylbenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in sample. U = Under detection limit.

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5 July to 27 September, 2007

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	Thurs 7/5	Wed 7/11	Tues 7/17	Mon 7/23	**Sun 7/29**	**Sat 8/4**	Fri 8/10	Thurs 8/16	Wed 8/22	Tues 8/28	Mon 9/3	**Sun 9/9**	**Sat 9/15**	Fri 9/21	Thurs 9/27
p-Dichlorobenzene	ND	0.04U 0.05U	ND	0.02U	ND	ND 0.02U	ND	ND	ND	ND					
o-Dichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
1,2,4-Trichlorobenzene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					
Hexachloro-1,3-Butadiene	ND	ND ND	ND	ND	ND	ND ND	ND	ND	ND	ND					

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DATA SUMMARY
FOR VOC SAMPLES COLLECTED AT CHEROKEE NATION'S PRYOR SITE FROM APRIL 6 THROUGH JUNE 29, 2007

I have analyzed the data for our fourteen valid VOC samples of the spring season, which were collected from April 6 through June29, 2007. The following is a summary of my analyses.

14 of 18 samples are valid samples, as the canisters had final pressures that were less than zero or more than zero. Data completeness (14 valid samples out of 18 total samples) = 78%. This is less than the desired data completion rate of 85%. Duplicate samples collected on April 18 are invalid due to a suspected canister leak. Duplicate samples for June 29th are invalid because they were collected over a period of 110.04 hours from midnight on June 29th to 2:00pm on July 3rd.

ERG analyzed each of the 14 valid samples for 60 VOCs.

The number of VOCs detected in each sample ranged from 15 (Sunday, May 6) to 25 (April 30). The average number of VOCs detected in each sample was 22, which was higher than the average of 18.9 VOCs detected in the 16 valid samples collected during the winter of 2007 but lower than the average of 26.1 VOCs detected in the 17 valid samples collected during the autumn of 2006.

The lab (ERG) reported the same MDLs for samples collected in April, May, and June as for the samples collected in February and March. 12 of these MDLs achieved for VOCs in samples collected in February through June were higher than one of the EPA Region 6 Human Health Medium-Specific Screening Levels of concern. [These screening levels are described in the following paragraph.] **MDLs in excess of a screening level are of concern because they include the MDLs for 1,3-butadiene, acrolein, carbon tetrachloride, and trichloroethylene – four of the VOCs that exceeded a screening level in one or more samples collected in the autumn of 2006, in the winter of 2007, and in the spring of 2007. These higher MDLs make it more likely that false negatives will be reported for VOCs of particular concern. The probability of false negatives must be reduced in future sample analyses.**

I compared the concentrations of detected VOCs in the April, May, and June samples to the following benchmarks:

EPA Region 6 Human Health Medium-Specific Screening Levels
  Chronic inhalation toxicity values (non-cancer and cancer values)
  Region 6 Screening values for ambient air
Oklahoma Department of Environmental Quality (ODEQ) MAACs
ATSDR Minimal Risk Levels (MRLs) for inhalation

3 to 6 detected VOCs equalled or exceeded one or more of these benchmarks in each sample. The VOCs exceeding these benchmarks were as follows:

Acrolein, exceeding a benchmark in all 14 valid samples, with a concentration range in these fourteen samples of 0.82 to 3.38 ug/m3.

Chloromethane, exceeding a benchmark in 10 samples, with a concentration range in those ten samples of 1.12 to 1.53 ug/m3.

1,3-Butadiene, exceeding a benchmark in 1 sample, with a concentration in that sample of 0.04 ug/m3.

Chloroform, exceeding a benchmark in 4 samples, with a concentration range in those four samples of 0.09 to 0.10 ug/m3.

Benzene, exceeding a benchmark in all 14 valid samples, with a concentration range in these fourteen samples of 0.21 to 0.70 ug/m3.

Carbon tetrachloride, exceeding a benchmark in all 14 valid samples, with a concentration range in these fourteen samples of 0.55 to 0.81 ug/m3.

Trichloroethylene, exceeding a benchmark in 2 samples, with a concentration in each of those samples of 0.13 ug/m3.

Chloromethane, chloroform, and trichloroethylene exceeded only screening levels.

Benzene and carbon tetrachloride exceeded both screening levels and cancer benchmarks.

1,3-Butadiene exceeded a cancer benchmark.

Acrolein exceeded both screening levels and a non-cancer benchmark. In addition, acrolein was the only VOC to exceed an ODEQ MAAC and an ATSDR MRL.

Results for the two duplicate samples collected on April 30 were good. Only 5 of the 23 to 25 detected VOCs had a relative percent difference (RPD) greater than 25%, but one of these 5 VOCs was acrolein, which exceeded two benchmarks. The RPD for acrolein in the two duplicate samples was 26%.

The benzene/toluene ratios in the fourteen valid samples ranged from 0.31 to 1.75. The ratios in the samples collected on Friday, May 18, and on Monday, June 11, were 0.35 and 0.31 respectively. These two ratios are characteristic of vehicular (gasoline engine) emissions. The ratios in the other twelve samples ranged from 0.55 to 1.75, and these ratios are NOT characteristic of vehicular (gasoline engine) emissions. The May 18 sample and the June 11 sample are the only two of the 47 valid samples collected from September 26, 2006 to June 29, 2007 that had a ratio characteristic of vehicular emissions. There is no apparent explanation for the low ratios in these particular samples.

The concentrations of carbon tetrachloride and chlorofluorocarbons [Dichlorodifluoromethane (freon 12), Dichlorotetrafluoroethane (freon 114), and Trichlorofluoromethane (freon 11)] detected in the fourteen samples were relatively stable. The concentration ranges of each of these VOCs in the fourteen samples were as follows: carbon tetrachloride (0.55 to 0.81 ug/m3); Freon 12 (2.20 to 2.80 ug/m3); Freon 114 (0.04U to 0.13U ug/m3); and Freon 11 (1.23 to 1.74 ug/m3). This is consistent with the fact that such VOCs have stable global background concentrations in the USA.

There were no exceedances of NAAQS standards (24-hour or 8-hour standard, as applicable) for NO2, SO2, PM10, PM2.5, and ozone at the Pryor station on any of the thirteen VOC sample days.

Finally, the wind direction was predominantly from the south on eleven of the thirteen sample days, with the wind also coming from the west on April 6 and May 12, from the east on April 12, May 12, May 18, June 11, and June17, and from the north and northeast on June 5, June 11, and June 23. Wind speeds varied from 0 to 13 mph on eleven of the thirteen sample days. Valid meteorological data are not available for May 24 and May 30 due to technical problems with the

datalogger at Cherokee Heights on those days. The Cherokee Heights tribal housing complex and the city of Locust Grove lie to the east and southeast of the Pryor monitoring station; U. S. highway 412 lies south of the station; Mid-America Industrial Park lies to the west, southwest, and northwest of the station; and other industry lies to the northeast of the station. There was little or no rainfall on eight of the thirteen valid sample dates, while 1.94 inches of rain fell on April 24, 2.45 inches of rain fell on June 11, and 1.71 inches of rain fell on June 23. Ambient air temperatures ranged from a low of 32 degrees F on April 6 to a high of 87 degrees F on June 5.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS

Analysis of the 47 valid samples collected from September 26, 2006 to June29, 2007 revealed no obvious seasonal trends in occurrences or concentrations of VOCs (see attached Tables of seasonal trends data), although the data has not been subjected to statistical analysis. The decline in the average number of VOCs detected in the 2007 samples was an artifact of the higher MDLs achieved by the lab for those samples (see discussion of MDLs above). Otherwise, particular VOCs did not appear or disappear with the changing seasons, and the concentrations of detected VOCs did not show a tendency to rise or fall with the changing seasons. The concentrations of detected VOCs remained steady, fluctuating within a narrow range of concentrations that showed little or no change with the seasons. The concentrations of some VOCs remained remarkably constant, perhaps because they were present only at concentrations that were very close to the method detection limits that the lab (ERG) could achieve.

Of the eight VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of the 47 valid samples, only acrolein showed a very slight tendency to change in concentration with the seasons. Acrolein was present at its highest concentrations in September and early October, 2006, then declined very slightly in concentration after mid-October. Six of the other seven VOCs showed no tendency to rise or fall in concentration with the changing seasons, while the remaining VOC (1,2-dichloroethane) was detected in only one sample (November 25). Meanwhile, the concentrations of carbon tetrachloride leveled off at the low end of their range during the months of January and February, 2007.

ERG analyzed each of the 14 valid samples collected in April, May, and June, 2007 for a suite of 60 VOCs (see attached Table of seasonal trends data). 14 VOCs were detected in all 14 valid samples, while 9 other VOCs were detected in 8 to 13 samples. Of the seven VOCs that exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more of these 14 valid samples, acrolein, chloromethane, benzene, and carbon tetrachloride were detected in all 14 samples, while chloroform was detected in 5 samples, trichloroethylene was detected in 2 samples, and 1,3-butadiene was detected in 1 sample.

Conversely, 32 VOCs were undetected in all 14 samples, while the 5 remaining VOCs were detected in 1 to 5 samples.

There are relatively stable global background concentrations of carbon tetrachloride and chlorofluorocarbons (such as freons) in the atmosphere. Therefore, it was no surprise that carbon tetrachloride and three of the other four chlorofluorocarbons included in sample analyses for this project were detected in all 14 valid samples collected in April, May, and June at concentrations that showed no tendency to vary with the changing seasons.

VOC concentrations in the four samples collected on a Saturday or Sunday did not appear to differ significantly from VOC concentrations in samples collected on week days. Thus there are few, if any, noticeable changes in VOC concentrations on weekends, when industrial activity at Mid-America Industrial Park and other nearby industries might be expected to decline. However, the minimum number of VOCs detected (15) occurred on Sunday, May 6.

In summary, nine months of VOC data have been collected so far, and, as yet, no seasonal trends have become apparent in the occurrences and concentrations of VOCs.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

6 April to 29 June, 2007

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VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
	Fri 4/6	Thurs 4/12	Wed 4/18	Tues 4/24	Mon 4/30	**Sun 5/6**	**Sat 5/12**	Fri 5/18	Thurs 5/24	Wed 5/30	Tues 6/5	Mon 6/11	**Sun 6/17**	**Sat 6/23**	Fri 6/29
Acetylene	2.29	0.48		0.45	0.41 0.43	0.10	0.34	0.55	0.20	0.46	0.27	0.19	0.29	0.61	0.71 0.71
Propylene	0.87	0.61		1.09	0.54 0.46	0.48	0.37	0.50	0.43	0.72	1.16	0.54	1.13	0.53	0.61 0.53
Dichlorodifluoromethane (Freon 12)	2.42	2.51		2.74	2.59 2.79	2.21	2.77	2.80	2.20	2.40	2.53	2.61	2.47	2.68	3.09 3.62
Chloromethane	**1.22**	1.07		**1.53**	**1.22** **1.32**	1.01	**1.18**	1.09	1.01	**1.13**	**1.12**	**1.37**	**1.26**	**1.46**	**1.42** **1.51**
Dichlorotetrafluoroethane (Freon 114)	0.04U	0.11U		0.11U	0.13U 0.12U	0.11U	0.11U	0.11U	0.10U	0.11U	0.11U	0.11U	0.11U	0.13U	0.05U 0.12U
Vinyl Chloride	ND	ND		ND	ND ND	ND	0.02U	ND	ND	0.01U	0.02U	0.01U	0.02U	0.01U	ND ND
1,3-Butadiene	0.03U	**0.04**		0.03U	0.03U 0.03U	0.01U	0.03U	0.02U	ND	0.02U	0.04U	0.01U	0.02U	0.01U	**0.07** **0.08**
Bromomethane	0.04U	0.05U		0.04U	0.04U 0.05U	0.06U	0.05U	0.04U	0.05U	0.05U	0.05U	0.06U	0.07U	0.06U	0.05U 0.06U

* VOCs shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark in one or more samples.

** Sample dates on weekends and holidays are shown in **Bold Face**. Sample concentrations are in micrograms per cubic meter. Sample dates with two concentrations indicate duplicate samples. Sample concentrations shown in **Bold Face** exceeded an EPA, ATSDR, or ODEQ health-based benchmark. ND = VOC not detected in this sample. U = Under detection limit.

Duplicate samples that ran on April 18th were invalid due to suspected canister leak. Duplicate samples of June 29th were invalid because they were collected over a period of 110 hours, from June 29th through July 3rd.

SEASONAL TRENDS IN DETECTED VOC CONCENTRATIONS AT CHEROKEE HEIGHTS

6 April to 29 June, 2007

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VOC Detected in One or More Valid Samples *	Valid Sample Dates **														
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Chloroethane	0.03U	0.06		0.05U	0.07 0.07	0.05	0.05U	0.07	0.06	0.04U	0.08	0.05U	0.05	0.04U	0.04U 0.04U
Acetonitrile	0.11	0.16		0.34	0.24 0.23	0.39	0.28	0.19	0.36	0.32	0.24	0.31	1.65	0.31	0.37 0.38
Acrolein	**3.38**	**1.22**		**1.16**	**1.07** **0.82**	**2.23**	**1.17**	**2.17**	**1.66**	**2.50**	**1.34**	**2.89**	**1.98**	**1.78**	**2.18** **2.13**
Trichlorofluoromethane (Freon 11)	1.35	1.37		1.48	1.36 1.52	1.23	1.58	1.58	1.29	1.23	1.29	1.74	1.36	1.38	13.60 14.50
Acrylonitrile	ND	ND		ND	ND ND	ND	ND	ND	ND	0.04U	0.03U	ND	ND	ND	ND ND
1,1-Dichloroethene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Dichloromethane (Methylene Chloride)	0.17	0.20		0.16	0.17 0.22	0.16	0.27	0.21	0.15	0.16	0.22	0.22	1.37	0.16	0.36 0.36
Carbon Disulfide	0.03U	ND		0.11	0.05U 0.04U	0.04U	ND	0.04U	ND	0.05U	0.08	0.07	0.06U	0.06U	0.28 0.36

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Trichlorotrifluoroethane	0.58	0.78		0.65	0.65 0.71	0.71	0.72	0.71	0.68	0.60	0.63	0.66	0.61	0.65	0.63 0.68
Trans-1,2-Dichloroethylene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
1,1-Dichloroethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Methyl tert-Butyl Ether	ND	ND		ND	ND ND	ND	ND	0.01U	ND	ND	ND	ND	ND	ND	ND ND
Methyl Ethyl Ketone	4.88	3.49		3.28	3.43 2.41	6.35	2.62	3.78	3.75	8.66	5.53	6.89	7.80	6.35	3.87 3.55
Chloroprene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
cis-1,2-Dichloroethylene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Bromochloromethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND

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Chloroform	0.06U	0.06U		0.07U	0.08U **0.09**	0.05U	**0.10**	**0.09**	0.07U	0.07U	**0.09**	0.07U	0.07U	0.08	ND ND
Ethyl tert-Butyl Ether	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
1,2-Dichloroethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
1,1,1-Trichloroethane	0.09	0.10		0.09	0.09 0.10	0.08U	0.11	0.10	0.09	0.08U	0.08U	0.08U	0.08U	0.09	0.09U 0.11
Benzene	**0.70**	**0.56**		**0.52**	**0.54** **0.60**	**0.21**	**0.43**	**0.40**	**0.23**	**0.46**	**0.61**	**0.46**	**0.33**	**0.36**	**1.77** **2.15**
Carbon Tetrachloride	**0.81**	**0.57**		**0.67**	**0.65** **0.74**	**0.59**	**0.74**	**0.70**	**0.63**	**0.55**	**0.59**	**0.59**	**0.66**	**0.79**	**0.67** **0.80**
tert-Amyl Methyl Ether	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
1,2-Dichloropropane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND

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Ethyl Acrylate	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Bromodichloromethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Trichloroethylene (TCE)	ND	ND		0.09U	0.06U 0.06U	ND	ND	ND	ND	**0.13**	0.04U	**0.13**	ND	0.10U	0.07U **0.11**
Methyl Methacrylate	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12 0.16
cis-1,3-Dichloropropene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Methyl Isobutyl Ketone	0.44	0.29		0.51	0.34 0.30	0.39	0.25	0.39	0.36	0.82	0.69	0.82	0.61	0.60	0.57 0.55
trans-1,3-Dichloropropene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
1,1,2-Trichloroethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND

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Toluene	0.40	0.57		0.42	0.64 0.96	0.28	0.53	1.15	0.42	0.57	0.95	1.49	0.46	0.40	12.60 22.60
Dibromochloromethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.04U 0.03U
1,2-Dibromoethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
n-Octane	0.18	0.07		0.14	0.11 0.11	ND	0.07	0.04	0.05	0.16	0.17	0.15	0.10	0.08	0.31 0.43
Tetrachloroethylene	0.03U	0.08		0.04U	0.05U 0.07	ND	0.05U	0.05U	ND	0.04U	0.05U	0.10	0.05U	0.05U	**1.41** **3.78**
Chlorobenzene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.09 0.08
Ethylbenzene	0.10	0.09		0.10	0.13 0.17	0.03U	0.11	0.09	0.05U	0.12	0.18	0.14	0.10	0.10	0.98 1.29
m,p-Xylene	0.20	0.13		0.18	0.25 0.36	0.07U	0.21	0.16	0.10	0.22	0.39	0.27	0.18	0.17	3.21 3.90

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Bromoform	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Styrene	0.08	0.05		0.11	0.08 0.08	ND	0.08	ND	0.07	0.60	0.24	0.12	0.12	0.13	0.76 0.68
1,1,2,2-Tetrachloroethane	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
o-Xylene	0.10	0.09		0.10	0.12 0.15	0.04U	0.13	0.10	0.05	0.11	0.18	0.14	0.10	0.10	1.17 1.42
1,3,5-Trimethylbenzene	0.05	0.02U		0.06	0.06 0.06	0.01U	0.05	0.04U	0.01U	0.07	0.08	0.07	0.05	0.05	0.38 0.41
1,2,4-Trimethylbenzene	0.11	0.08		0.13	0.12 0.12	0.04U	0.12	0.09	0.05	0.15	0.21	0.16	0.12	0.10	1.39 1.44
m-Dichlorobenzene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Chloromethylbenzene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND

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p-Dichlorobenzene	ND	0.02U		ND	0.02U 0.02U	ND	0.02U	ND	ND	0.02U	0.03U	0.02U	0.02U	0.02U	0.08U 0.08U
o-Dichlorobenzene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05U 0.08U
1,2,4-Trichlorobenzene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND
Hexachloro-1,3-Butadiene	ND	ND		ND	ND ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND ND

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